

Original Research Article

Causes of Complete Removable Denture Renewal: A Tunisian Cross-Sectional Study

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Received: 17.01.2022

Accepted: 21.02.2022

Published: 27.02.2022

Journal homepage:<https://www.easpublisher.com>**Quick Response Code**

Abstract: The renewal of removable dentures is often suggested to denture wearers subject to discomfort. However, the impact of this rehabilitation on patients' oral health related quality of life and their removable dentures related satisfaction is still unknown. This study was aimed at assessing these patient-centered outcomes and the potential impact of different factors. **Materials and methods:**

- In our study, the most appropriate parameters to assess the prosthetic quality have been collected to evaluate the satisfaction perceived by patients about their denture; their complaints and the causes of the refabrication.
- A completely new questionnaire has been drawn up including: Reason patients requested new dentures (fit, esthetics, broken denture, wear, recommendations of dentist, extractions), satisfaction with the old prosthesis (general, retention, stability, comfort, pronunciation, chewing, esthetics), and technical quality of the old prosthesis as assessed by a dentist (stability, retention, fit, border, wear, esthetics).
- Gender, age and socio-economic status were included as confounding variables
- Fifty patients have been included in the survey, they have undergone a clinical examination, and we have filled out the questionnaire anonymously.

The Chi2 test, ANOVA test, and Pearson correlation test have been employed to relate clinical and anamnestic factors to the causes of removable denture renewal.

Keywords: Denture Renewal, Tunisian, Sectional Study.

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I. INTRODUCTION

Despite the numerous treatment modalities available for the rehabilitation of edentulous people, a considerable number of patients, out of necessity or choice, receive conventional complete dentures, and because of the quality of such dentures, patient's ability to wear them is a challenging process.

However, defiance in dental practice continues to be the successful management of the complete denture patient who experiences ongoing difficulty with dentures.

Often, there isn't a total agreement between the patient and the dentist about the adequacy of their dentures; this can lead to a protracted period of

discouraging "adjustment appointments" that may not result in the eventual resolution of the problem.

It is often concluded that there is some patient factor; either age, gender, medical, or psychological status that is hindering the success of treatment [10].

The fact that poor denture quality may be well tolerated in one person, while a well made one may be a failure in another, has been a frequent source of confusion and frustration.

This, has led many dentists away from taking proper care in the construction and provision of good quality dentures, in the belief that the patient will adapt

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to almost anything irrespective of the quality [23, 8, 28].

Many authors cite the most frequent complaints with complete dentures are those pertaining to retention and stability, esthetics, comfort while eating, and the accumulation of food under the appliance [20, 11, 21, 20].

Some patients find it difficult to adequately manage removable prostheses, especially complete dentures [25, 8, 5].

- Moreover, systemic medical conditions and local physical factors may make the successful wearing of a removable prosthesis difficult. Medication required for systemic or local disease can adversely affect oral tissues and the quantity and quality of produced saliva.
- A thorough understanding of the parameters that influence complete denture integration is useful to decide whether denture replacement is meaningful.
- Based on a substantial existing literature, the most appropriate parameters to assess the prosthetic quality have been collected to evaluate the satisfaction perceived by patients about their denture; their complaints and, the causes of the renewal.
- By conducting this study, our aims were to:
 1. Assess the patients' motivations and opinions about their old dentures
 2. Expose the main reasons to indicate denture replacement
 3. Investigate the causes of renewal of complete removable dentures
 4. Evaluate factors that may help practitioners predict therapeutic benefits when deciding on the need for denture replacement.

II. MATERIALS AND METHODS

- The study was established in the department of complete removable denture of the Dental Clinic of Monastir, Tunisia within a period of six months.
- Fifty edentulous patients have been included in the survey. Only patients requesting the renewal of their complete removable denture were selected, and no specific exclusion criteria were applied.

They have undergone a clinical examination; the condition of the patient's denture-bearing tissues was assessed at the initial appointment.

- Appropriate parameters to assess have been collected to evaluate the prosthetic quality, the satisfaction perceived by patients about their denture and their complaints, and the causes of the refabrication.

A completely new questionnaire has been drawn up, including: (figure1). Satisfaction with the old prosthesis (general retention, stability, comfort, pronunciation, chewing, esthetics), its technical quality as assessed by a dentist (stability, retention, fit, border, wear, aesthetics).

Patients requesting new dentures reasons (fit, esthetics, broken denture, wear, recommendations of dentist, extractions).

- A single experimenter (The author of this paper) performed the whole needed prosthetics and oral examination and was responsible for filling the questionnaire.

The patients' comments regarding the adequacy of their dentures were recorded.

- Gender, age, and socio-economic status were included as confounding variables
- Information regarding the patients' general medical condition, psychological health, or other elements were also noted.
- Intraoral examination screened for maxillary and mandibular oral status, objective practitioner assessment was noted.
- All individuals were kept obscured by the clinician's judgment of their denture renewal to prevent their responses from being influenced by the outcome of the examination. From the analysis of the individual points considered and their associated responses, it will be possible to evaluate the major difficulties encountered by the patients.
- The Chi² test, ANOVA test, and Pearson correlation test have been employed to relate clinical and anamnestic factors to the causes of removable denture renewal.

Clinique dentaire de Monastir
Service de Prothèse Amovible Complète
Mai 2021

1- Anamnèse:

*Sexe
 *Age :
 *Profession :
 *Antécédents généraux :

 *Antécédents médicaux :

 *Médication en cours:

2- Etat oral :

*Classe squelettique:.....
 *Typologie faciale :.....
a/ Maxillaire:
 * Classe de Sanguiolo :.....
 *Fibromuqueuse :.....

La dimension vertical d'occlusion
 Le plan d'occlusion

 *Défaut d'intégration esthétique

 *Défaut d'intégration psychologique
 *Autres :.....

4-Décision prothétique :

* Rebasage direct
 * Rebasage indirect
 * Empreinte tertiaire
 *Reprise
 Remarques :.....

Fig-1: The questionnaire as filled by the experimenter

b/ Mandibule:
 * Classe de Sanguiolo :.....
 *Fibromuqueuse :.....

3-Prothèse :

a/ Conception :
 Service de Prothèse totale
 Autre département/ Autre CHU
 Secteur privé

b/ Ancienneté de la prothèse :.....

c/ Satisfaction du patient (Likert scale) :
 - Très satisfait.
 - Satisfait
 - Ni satisfait, ni insatisfait
 - Insatisfait
 - Très insatisfait

d/ Date d'apparition des doléances, Motifs d'interventions:

e/ Evaluation prothétique:
 *Instabilité : Statique
 Dynamique
 * Manque de rétention
 *Fracture prothétique
 *Porosité de la base prothétique
 *Abrasion fonctionnelle des dents prothétiques
 *Problème occlusal : La relation centrée

III. STATISTICAL ANALYSIS AND RESULTS

Statistics were obtained by processing information with the statistical package SPSS. The tests used were Chi-square test, Pearson Test and ANOVA test.

Means (M), Standard deviation (SD), Odds ratios (ORS), 95% confidence intervals and p values were estimated.

P values <0.05 were considered statistically significant and analyses were performed using the Japanese edition of SPSS20.0.

A-Descriptive Results

1-Study population

The population consisted on 50 complete denture wearers 74% were males. The average age of our sample was under 70 years, which is about 54% of the study subjects (Figure 2).

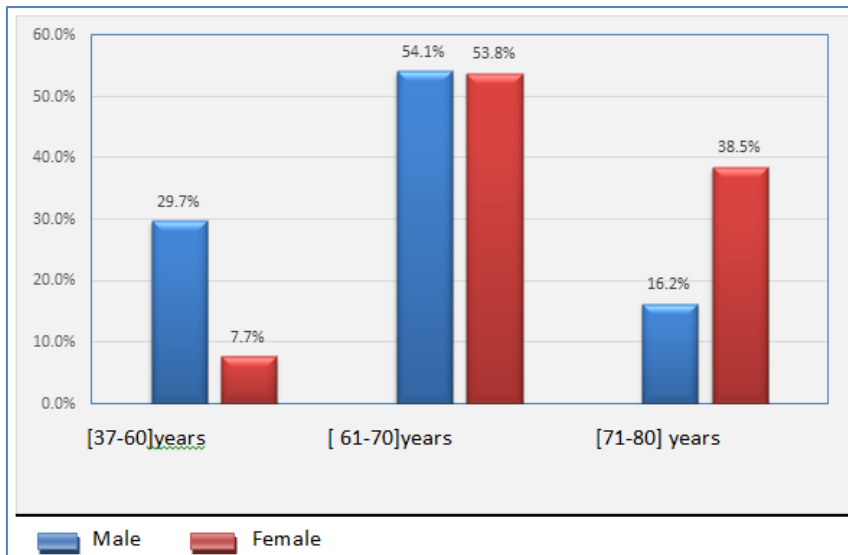


Fig-2: Patient distribution according to age and gender

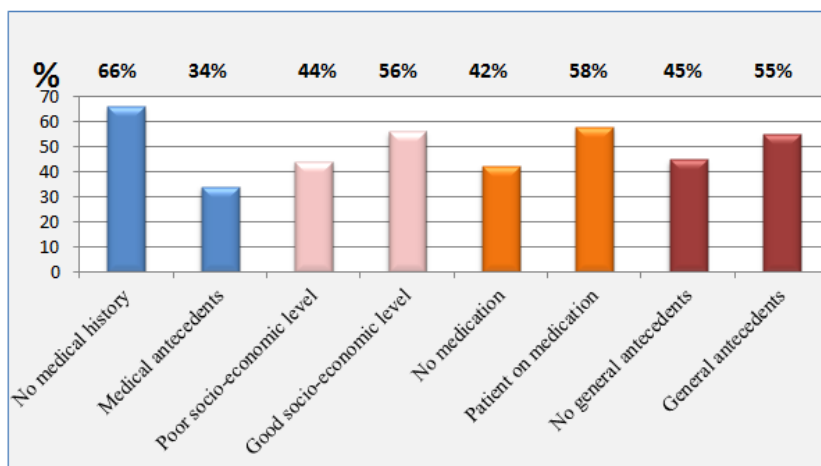


Fig-3: Demographic characteristics of patients

From a total of 50 patients selected, 34% presented chronic and debilitating conditions, 55% of them experienced an illness or disease state and 58% were on medication (Figure 3).

These conditions included respiratory disease, advanced coronary conditions, renal failure, endocrine

disorders, degenerative or inflammatory bone and joint disorders and diagnosed emotional or psychological disorders (anxiety or depression).

2-Oral Status

Table-1: Summary table of Patients characteristics

Characteristics	NO.(%) of patients (N=50)	
Sanguiolo Class in the maxilla	Class I	74 (37)
	Class II	8 (4)
	Class III	18 (9)
Sanguiolo Class in the mandible	Class I	54 (27)
	Class II	6 (3)
	Class III	40 (20)
Maxillary Fibromucosa	Adherent	47 (37)
	Hyperplastic	26 (13)
Mandibular fibromucosa	Adherent	82 (41)
	Hyperplastic	18 (9)

Clinical and oral examination revealed that

- In the maxilla, 74% of the patients presented a Class I of Sanguiolo
- In the mandible, 54% of the patients presented a Class I of Sanguiolo (Table1).

Besides, the condition of the patient’s denture bearing tissues was assessed; oral examination revealed

that hyperplastic fibromucosa was present with 26% on maxilla and 18% on the mandible (Table 1).

3-Prosthetic evaluation

The majority of the complete removable denture (72%) was conceived in the complete removable denture department on the dental clinic of Monastir, Tunisia under the supervision of experienced prosthodontists and department’s professors (Figure 4).

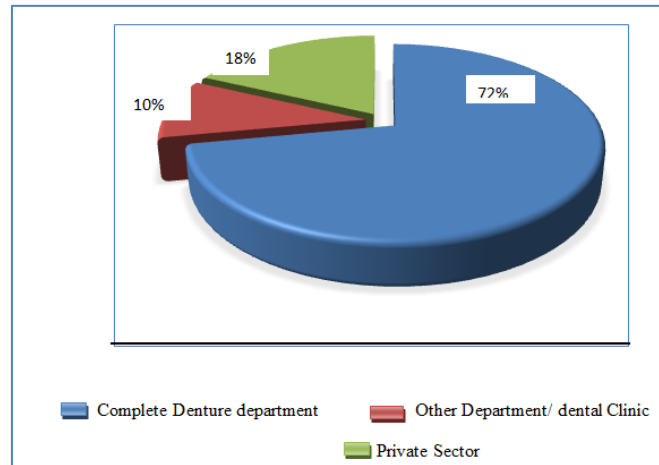


Fig-4: Distribution of Prosthesis conception place

Table-2: Means of Prosthesis insertion period and date of complaints’ appearance

	Gender	N	Minimum(days)	Maximum(days)	Mean(days)	Std.Deviation
Prosthesis insertion period	Male	37	1	5840	1589,95	1587,15
	Female	13	60	5840	1904,23	1947,51
	Total	50	1	5840	1671,66	1673,01
Date of complaints’ appearance	Male	37	0	2190	216,32	459,772
	Female	13	2	1825	366,92	589,843
	Total	50	0	2190	255,48	494,938

As regards the prosthesis insertion period, duration varied from one day to 16 years for males, and from 60 days to 16years for females (Table 2).

days- 6 years for males, and 0 days -5 years for females (Table 2).

These descriptive results included the date of complaints’ appearance which fluctuates between 0

4-Patients’ satisfaction

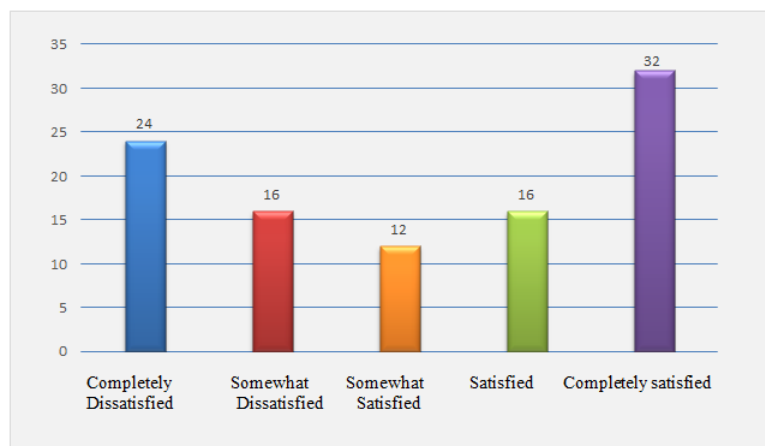


Fig 5: Satisfaction with old prosthesis distribution (Likert Scale)

According to statistical results, 32% of patients tended to be completely satisfied with the quality and

efficiency of their complete denture on the contrary, 24% were completely dissatisfied (Figure 5).

5-Experimenter’s assessment

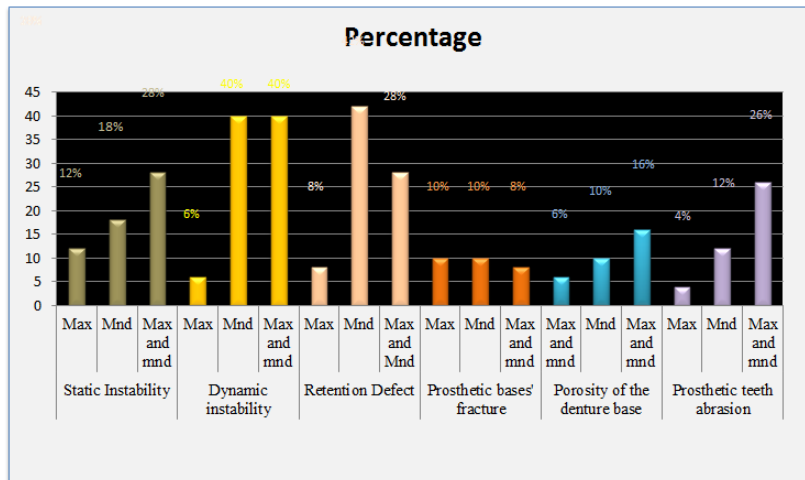


Fig-6: Distribution of technical qualities of old prosthesis for maxilla (max) and mandible (mnd) as assessed by the prosthodontist

In order to assess technical qualities of old prosthesis, examination was as follow:

To evaluate retention, the evaluator tried to remove the prosthesis by pulling simultaneously on two symmetrically positioned teeth of the prosthesis. The retention score was determined by the ease of dislodgement of the prosthesis following these manipulations.

To evaluate stability, subjects were asked to perform the following actions: swallow, count from 1 to 10, and protrude and laterotrude the mandible and the tongue, and inflate the cheeks, in addition the assessor alternately pressed a finger on the occlusal surfaces of the right and left premolar/canine region. Stability was scored depending on the presence and the extent of rotational or rocking moments of the prosthesis.

The assessment of border fit evaluated the correct length of prosthesis flanges as well as the presence of sharp or rough edges. General fit was defined as a global evaluation item, combining denture stability, retention, and border fit.

The evaluation also included the presence and extent of tooth abrasion, thin or broken edges, damage at the prosthesis base, and porosity.

The major defects were: (Figure 6)

- 28% both maxillary and mandibular static instability, 40% mandibular dynamic instability,
- 42% mandibular retention defect, 10% of broken dentures,
- 16% of bimaxillary porous denture bases and 26% of both maxillary and mandibular prosthetic teeth abrasion.

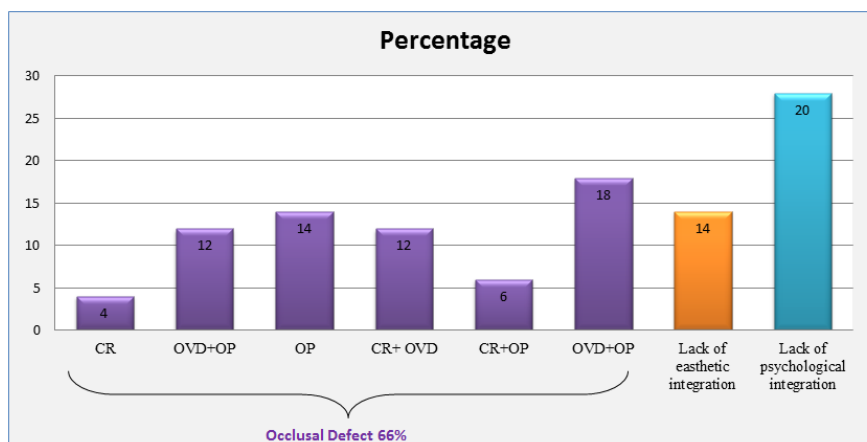


Fig-7: Denture failure parameters’ distribution as assessed by a prosthodontist (CR= centric relation, OVD= occlusal vertical dimension, OP= occlusal plane)

Among dentures' parameters assessed in our study, occlusal defect was the most important element affecting denture quality, with a percentage of 66%. An examination of the dentures was conducted to determine the adequacy of the denture base and occlusal scheme design according to the principles of base design and complete denture occlusion.

Statistics showed that most occlusal defects were caused by a wrong occlusal plane orientation

(14%) and both wrong occlusal plane and vertical dimension determination (18%).

Only 4% of the patients presented a centric relation defect. Nevertheless, 20% of the study population called for denture renewal because of a lack of psychological integration, a complaint that should seriously be considered by practitioners (Figure 7).

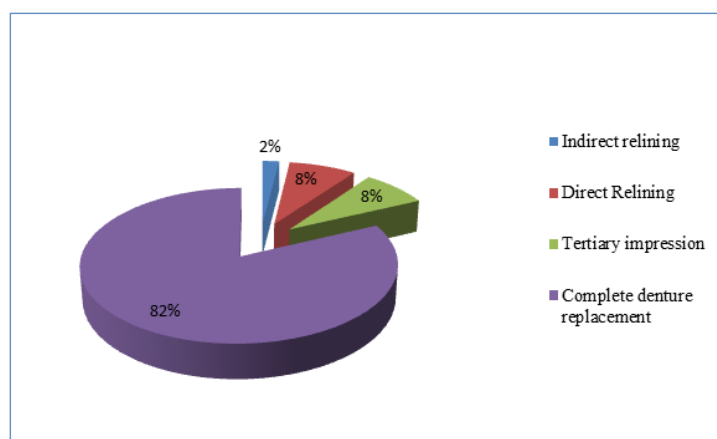


Fig-8: Distribution of prosthetic decision

Figure 8 illustrates the different prosthetic decisions taken by the experimenter in response to the denture examination and evaluation regardless of patients' complaints.

The decision of denture renewal was taken for 82% of the patients. Only 2% of them needed indirect relining, direct relining and tertiary impression were performed for 8% of patients.

B-Analytic results

In order to determine whether there was a relationship between denture quality parameters and the

decision of renewal, a Chi-square test or ANOVA test were performed for each of the eleven denture quality parameters assessed by the experimenter (Table3).

A significant statistical correlation ($p < 0.05$) was found when comparing the decision of complete denture renewal with:

- Occlusal defect (0.047),
- Centric relation defect (0.22),
- Maxillary prosthetic teeth abrasion (0.047) and prosthetic insertion period (0.023).

Table-3: Correlations between denture quality parameters and the decision of denture renewal

Denture quality parameters	p values
Occlusal defect	0.047
Lack of esthetic integration	0.746
Centric relation defect	0.022
Base porosity	0.16
Maxillary Prosthetic teeth abrasion	0.047
Denture base fracture	0.524
Prosthetic teeth abrasion	0.539
Retention defect	0.196
Dynamic instability	0.782
Static instability	0.182
Prosthesis insertion period	0.023

On the other hand, there were not statistical relations between the decision of denture replacement

and the populations' characteristic as described in Table 4.

Table-4: Correlation between the decision of denture renewal and Population characteristics.

	p values
Gender	0.575
Age	0.542
Socio-economic level	0505
Skeletal Class	0.116
Sanguiolo Class	0.696
Lack of psychological integration	0.282

No significant correlations were found between population characteristics and the decision of denture refabrication.

IV. DISCUSSION

The decision of complete denture renewal was analyzed in our study relating to many factors:

*General and medical history

It is assumed, that denture wearer who were medically comprised or being treated with medications that produce oral side effects with intraoral manifestations will experience more difficulties with their dentures.

Systemic medical conditions and local physical factors may make successful wearing of a removable prosthesis difficult.

Medication required for systemic or local disease can adversely affect oral tissues and the quantity and quality of saliva produced [17, 11, 26].

*Oral status including Sanguiolo Class and Fibromucosa condition

These parameters were investigated for the main reason that Researchers have reported a direct association between the oral musculature, the fibromucosa, and the residual ridge forms—in terms of the degree of bone resorption—and denture comfort, retention, mastication, and speech, as perceived by the patient [29, 27].

*The denture fabrication center and socio-economic level

In our study, the denture fabrication is ensured by competent dental technicians and all the steps are correctly carried out but it has to be mentioned that the waiting patients list is full, and as technical breakdowns and the shortage of dental materials can occur, denture conception can take more than two months.

In a previous study performed on patients who applied for complete or partial denture treatment at the Oral Health Center of Ministry of Health (OHC) and the Department of Prosthodontics, Faculty of Dentistry, Kırkkale University patients were asked where they would prefer denture treatment, regardless of cost, private practice was the preferred-choice [18].

In addition, researchers found that there was a significant relationship between income status and the treatment center where the patients apply. Low-income patients applied to the OHC (49%), while middle and high income groups applied mostly to the OHC. However, patients with very high income status mostly go to the university clinic (51%) [18].

*Occlusal parameters

The Results determined in this study, showed positive and significant correlations between the quality of occlusion including the centric relation, the occlusal plane orientation and the decision of renewing the complete denture.

Based on literature, this relationship could be explained by these arguments: Patients' dissatisfaction with removable complete dentures is essentially related to loss of retention (85, 9%) [6, 7].

Furthermore, it has been found that a clinically stable mandibular denture was the most important determinant of patients' satisfaction [30].

Several studies have pointed out the importance of occlusal scheme for achieving denture retention and patients' satisfaction [30].

For Lang *et al.* (2004) the most important factor that contributes to stability is the occlusal scheme and occlusal harmony [22].

This occlusion must be balanced: there are bilateral contacts (working and balancing) in the molar/premolar area in both centric and eccentric movements. If detection reveals lack of contact on multiple surfaces, unilaterally, occlusion should be considered unbalanced. Correct centric occlusion would also be expected to influence denture comfort, and thus patient satisfaction [16].

The basic considerations when establishing correct occlusion for complete dentures are ensuring that the occluding rows of artificial teeth will provide optimum chewing efficiency, functional stability of the prosthesis, and comfort during chewing without exerting injurious forces on the denture-bearing tissues or adversely affecting esthetics or phonetics.

It is assumed that tipping, sliding or heavy horizontal forces during the function of dentures will accelerate resorption of the effected ridge site.

Therefore the setup of the teeth in complete dentures has been reported to play a key role in minimizing the tipping and sliding movements when chewing forces are applied [15].

The importance of minimizing the nonphysiologic effects of occlusal forces by arranging the position of artificial teeth within the action zone of the tongue, cheeks and lips has also been emphasized.

***Prosthetic teeth abrasion**

The occlusal scheme and the tooth forms that will influence chewing efficiency deteriorate occlusal surfaces curves over time due to wear, which explain the significant correlation found between the prosthetic teeth abrasion, the denture age and the denture replacement [12].

Low-quality artificial teeth are softer, and thus tend to grind and wear easily which badly affects the occlusal plane orientation.

These survey findings highlight the importance of occlusal parameters as predictive factors of the prosthetic rehabilitation success.

***Denture age**

Conversely to the study by John *et al.*, the present study found a specific correlation between denture age and the necessity of renewing the complete denture.

However, to maintain optimal masticatory ability, the primary reason for a complete denture replacement should be based on denture quality rather than denture age [24, 3]

***Psychological status**

Some patients find it difficult to adequately manage removable prostheses of any kind, especially complete dentures [8, 5].

A previous study reported that complete denture wearers with a longer period of denture wearing were more satisfied with eating or the mastication ability of their denture, which can be explained by the influence of the psychological integration element.

The psychologic status of a patient also appears to have great bearing on his or her ability to manage removable prostheses [25, 5]

It has been reported that with advancing age, both men and women experience difficulty in learning to adapt to and manage removable prostheses.

Nevertheless, patients may have unrealistically high expectations of their dentures, often believing that the dentures will be comparable to their natural teeth [21, 4, 14].

All these elements, may lead to confusion when deciding on renewing or relining the complete denture.

Study's limits

- The fact that all denture quality assessments were done by the same dentist assured uniform scoring, but potentially compromised reproducibility of results. Moreover, due to the small sample size, results should be extrapolated with caution.
- The limitation to only one follow-up measurement also needs to be considered, because it has been shown that denture satisfaction involves over time [12].
- The fact that the dentures may be fabricated by postgraduate or undergraduate students might also have compromised the quality of the study; despite that, all dentures were made under strict supervision of experienced prosthodontists.
- The Monocentric aspect of this study.

CONCLUSION

- In this study complete denture patients experiencing difficulties with their dentures most frequently complained of lack of retention and dynamic instability, difficulty with eating, and looseness of their dentures.
- No significant correlations were found between population characteristics and the decision of denture refabrication.
- A significant statistical correlation ($p < 0.05$) was found when comparing the decision of complete denture renewal with:
 - Occlusal defect (0.047),
 - Centric relation defect (0.22),
 - Maxillary prosthetic teeth abrasion (0.047) and prosthetic insertion period (0.023).

The most frequently observed faults in denture construction were related to retention and vertical and horizontal jaw relationships.

By exposing the major parameters that must be taken into account when deciding to renew complete dentures these results may help practitioners in their daily prosthetic cases and assessments.

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Cite This Article: Y.Tayachi, O.Tayari, Rabeb Bedhief, J. Jaouadi (2022). Causes of Complete Removable Denture Renewal: A Tunisian Cross-Sectional Study. *EAS J Dent Oral Med*, 4(1), 26-35.